The claims:

1. An electrically powered apparatus for generating a solute to sanitise a body of water, a by-product of such generation being an explosive gas, said apparatus including:

   a) an electrolytic cell operable only in a substantially vertical orientation through a range of 45 degrees either side of the vertical;

   b) a water inlet and outlet both located at the lower end of said electrolytic cell; and

   c) a defined space surrounding the electrodes of said electrolytic cell,

   wherein, in the event that water flow through said apparatus ceases and said electrolytic cell continues to produce said explosive gas, said explosive gas will displace water in said defined space until there is no water around or between said electrodes,

   so that electrolysis and explosive gas production cannot continue and the maximum accumulated volume of said explosive gas is substantially restricted to that of said defined space.

2. An apparatus according to claim1, further including an orientation responsive means to switch off power to said electrolytic cell when said electrolytic cell is orientated outside said range.

3. An apparatus according to claim2, wherein said orientation responsive means is a tilt switch associated with said electrolytic cell, said tilt switch being adapted to prevent delivery of power to said electrolytic cell when said electrolytic cell is orientated outside said range.

4. An apparatus according to claim 3, wherein said tilt switch is wired and fitted into said electrolytic cell, wherein if said electrolytic cell is not vertically upright when plumbed, said tilt switch, which will have a predetermined electrical contact break at a specific angle of less than 45 degrees from the vertical, will activate to cut power to the electrolytic cell.

5. An apparatus according to claim 1, further including a lower chamber incorporating said inlet and said outlet.

6. An apparatus according to claim 5, further including a bi-directional water flow by-pass means in said lower chamber to cause a portion of the total water flow by-pass

said electrolytic cell, wherein said by-pass means regulates water flow to said electrolytic cell, allowing excess water flow to by-pass said electrolytic cell.

7. An apparatus according to claim 6, said integral by-pass may serving two purposes:

(1) to deliver a predetermined water flow through an electrode chamber defining said defined space whilst allowing excess water flow to by-pass said electrode chamber; and

(2) to prevent undesirable back pressure in systems where the flow rate must remain high.

8. An apparatus according to claim 7, wherein said by-pass allows for variable flow through the electrolytic cell and the activity of said electrolytic cell is regulated by a microprocessor in response to variations in flow rate.

9. An apparatus according to claim 8, wherein said apparatus includes a chlorinator power supply that uses current draw information derived from said cell electrodes to modulate and control power delivery to said electrolytic cell to fully optimise cell efficiency and durability even if the salinity is higher than ideal.

10. An apparatus according to claim 8, further including a salinity sensor adapted to communicate data to said microprocessor associated with said electrolytic cell, said microprocessor operable to regulate the operation of said electrolytic cell.

11. An apparatus according to claim 8, further including a current draw sensor adapted to communicate data to said microprocessor which responds to said data to regulate the operation of said electrolytic cell.

12. An apparatus according to claim 10, wherein said current draw data is directly related to the salt levels in the water such that if the current draw exceeds a predetermined maximum required for said electrolytic cell to produce a published chlorine maximum, an On/Off duty cycle of the power delivery to said electrolytic cell is altered so that the total chlorine production per hour is moderated to correspond to the desired chlorine production rate.

13. An apparatus according to claim 6, wherein said by-pass means comprises a bi-directional check valve, wherein said check valve provides for the bi-directional flow of water across said check valve whilst controlling the water flow provided by a pump through said electrolytic cell, the flow of water across the opening allowing enough water to flow through it in both directions such that it is at least equivalent to the rate at which the hydrogen gas displaces the water in the electrode chamber.

14. An apparatus according to claim 1, wherein said apparatus is adapted to be installed in a plumbing circuit using less than 200 mm of pipe space.

15. An apparatus according to claim 1, further including an inner bi-polar electrode bundle comprising between seven and nineteen electrode plates.

16. An apparatus according to claim 5, further including:

d) a cell column housing said electrolytic cell and defining said defined space, whereby said cell chamber defines a passage for the in-flow of water from said inlet; and

e) an outer chamber housing said cell chamber whereby an outer space is defined between the outer surface of said cell chamber and the inner surface of said outer chamber, the outer space serving as a return passage for outgoing water which has come from said electrolytic cell and is heading for said outlet.

17. An apparatus according to claim 16, further including a pressure relief valve in said lower chamber, wherein, in the event that both the water inlet and outlet are closed and augmentary electronic protection devices fail to detect the absence of water flow and fail to suspend power to the cell, said pressure relief valve will open to allow the hydrogen gas to displace the water from said cell chamber which, when complete, will effectively cause a cessation of electrolysis.

18. An apparatus according to claim 1, further including a flow switch to detect the absence of water flow through said apparatus, whereby said flow switch is adapted to effect the cutting of power to said apparatus if the water flow reaches an unsustainably low rate.

19. An apparatus according to claim 18, wherein said flow switch, an omni directional cell level switch, conductivity sensors, an integral bi-directional water by-pass and/or a pressure relief valve, combine with the vertical physical design of said electrolytic cell to minimise the hydrogen gas hazard and maximise safety, such that, even if said electrolytic cell is installed incorrectly, back to front or upside down, said electrolytic cell will produce no more hydrogen gas once said defined space is fille with the hydrogen gas.

20. An apparatus according to claim 1, wherein where there are less that a full complement of electrode plates necessary to fill said defined space, the defined space contains an insulator and flow regulator configured to fill at least a cross-sectional area of said defined space not occupied by the electrodes, whereby to provide

resistance to water flow which would otherwise be present with the full complement of plates, the arrangement being effective to ensure sufficient time exposure of the flowing water to said bundle.

Dated this 5th day of June 2004

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